**Option B - Biochemistry (SL/HL 1)**

**Option B: Human biochemistry (15/22 hours)**  
**B1 Energy - 0.5 hour**  
B.1.1 Calculate the energy value of a food from enthalpy of combustion data. (2)  
**B2 Proteins - 3 hours**  
B.2.1 Draw the general formula of 2-amino acids. (1)  
B.2.2 Describe the characteristic properties of 2-amino acids (2)   
B.2.3 Describe the condensation reaction of 2-amino acids to form polypeptides. (2)   
B.2.4 Describe and explain the primary, secondary ('-helix and (-pleated sheets), tertiary and quaternary  
structure of proteins. (3)   
B.2.5 Explain how proteins can be analysed by chromatography and electrophoresis. (3)  
B.2.6 List the major functions of proteins in the body. (1)   
**B3 Carbohydrates - 3 hours**  
B.3.1 Describe the structural features of monosaccharides. (2)   
B.3.2 Draw the straight-chain and ring structural formulas of glucose and fructose. (1)   
B.3.3 Describe the condensation of monosaccharides to form disaccharides and polysaccharides. (2)   
B.3.4 List the major functions of carbohydrates in the human body. (1)   
B.3.5 Compare the structural properties of starch and cellulose, and explain why humans can digest starch but not cellulose. (3)   
B.3.6 State what is meant by the term dietary fibre. (1)   
B.3.7 Describe the importance of a diet high in dietary fibre. (2)   
**B4 Lipids - 3.5 hours**  
B.4.1 Compare the composition of the three types of lipids found in the human body. (3)   
B.4.2 Outline the difference between HDL and LDL cholesterol and outline its importance. (2)  
B.4.3 Describe the difference in structure between saturated and unsaturated fatty acids. (2)   
B.4.4 Compare the structures of the two essential fatty acids linoleic (omega–6 fatty acid) and linolenic (omega–3 fatty acid) and state their importance. (3)  
B.4.5 Define the term iodine number and calculate the number of C=C double bonds in an unsaturated fat/oil using addition reactions. (2)   
B.4.6 Describe the condensation of glycerol and three fatty acid molecules to make a triglyceride. (2)  
B.4.7 Describe the enzyme-catalysed hydrolysis of triglycerides during digestion. (2)  
B.4.8 Explain the higher energy value of fats as compared to carbohydrates. (3)  
B.4.9 Describe the important roles of lipids in the body and the negative effects that they can have on health. (2)   
**B5 Micronutrients and macronutrients - 2 hours**  
B.5.1 Outline the difference between micronutrients and macronutrients. (2)   
B.5.2 Compare the structures of retinol (vitamin A), calciferol (vitamin D) and ascorbic acid (vitamin C). (3)  
B.5.3 Deduce whether a vitamin is water- or fat-soluble from its structure. (3)   
B.5.4 Discuss the causes and effects of nutrient deficiencies in different countries and suggest solutions. (3)   
**B6 Hormones - 3 hours**  
B.6.1 Outline the production and function of hormones in the body. (2)   
B.6.2 Compare the structures of cholesterol and the sex hormones. (3)   
B.6.3 Describe the mode of action of oral contraceptives. (2) Aim 8  
B.6.4 Outline the use and abuse of steroids. (2) Aim 8  
  
**Topics B7-B9 are HL material only!**  
**B7 Enzymes - 3 hours**  
B.7.1 Describe the characteristics of biological catalysts (enzymes). (2)   
B.7.2 Compare inorganic catalysts and biological catalysts (enzymes). (3)  
B.7.3 Describe the relationship between substrate concentration and enzyme activity. (2)  
B.7.4 Determine Vmax and the value of the Michaelis constant (Km) by graphical means and explain its significance. (3)  
B.7.5 Describe the mechanism of enzyme action, including enzyme substrate complex, active site and induced fit model. (2)  
B.7.6 Compare competitive inhibition and non-competitive inhibition. (3)  
B.7.7 State and explain the effects of heavymetal ions, temperature changes and pH changes on enzyme activity. (3)  
**B8 Nucleic acids - 3 hours**  
B.8.1 Describe the structure of nucleotides and their condensation polymers (nucleic acids or polynucleotides). (2)   
B.8.2 Distinguish between the structures of DNA and RNA. (2)   
B.8.3 Explain the double helical structure of DNA. (3)   
B.8.4 Describe the role of DNA as the repository of genetic information, and explain its role in protein synthesis. (2)   
B.8.5 Outline the steps involved in DNA profiling and state its use. (2)   
**B9 Respiration - 1 hour**  
B.9.1 Compare aerobic and anaerobic respiration of glucose in terms of oxidation/reduction and energy released. (3)   
B.9.2 Outline the role of copper ions in electron transport and iron ions in oxygen transport. (2)